

PLAN OF OPERATION SUPPLEMENTAL INFORMATION

The following secondary but useful information is placed here to reduce the size of the Plan Of Operation form.

ACCESS ROAD CONSTRUCTION. Road design considerations include: minimizing the number, lengths, and widths of roads; using or upgrading existing roads; locating roads to reduce sight and sound impacts; avoiding wet areas, unstable areas, and long steep grades; minimizing the number of stream crossings; keeping roads at least 50 feet from drainageways; varying road grades to break up drainage; providing adequate drainage by maintaining insloped, outsloped, and crowned roads and installing appropriate drainage structures; and seeding all road-related disturbances with the approved seed mix at the first seasonal opportunity.

Recommended road specifications include: 12-foot width single-lane roads; 24-foot width double-lane roads; 4-foot increased width on switchbacks; 10 percent maximum grade; 7 percent maximum switchback grade with 50-foot minimum radius; 1:1 cut slopes and 1.5:1 fill slopes (steeper in rock, gentler in less stable materials); 2 to 4 percent inslopes; and 2 percent outslopes.

COMPETATIVE INTRODUCED GRASSES. The Seed Mix Guideline states that the use of extremely competitive introduced grasses, particularly crested wheatgrass and smooth brome, is not recommended unless the area to be seeded is in or next to an area where such species are already established. These vigorous grasses have the ability to outcompete many native grass species. Crested wheatgrass and smooth brome have a place in separate areas used for early spring grazing or hay production, but not in native range areas.

DIVERSIONS AND DRAINAGEWAYS. Permanent diversions and reclaimed drainageways are constructed to carry surface water around, through, or from a reclaimed mine site. Design diversions to safely pass the runoff from at least a 10-year, 24-hour precipitation event. Design reclaimed drainageways to approximate the channel grade, sinuosity, cross-section, substrate, and riparian vegetation of native drainageways. Diversions and drainageways must make stable connections to undisturbed drainageways above and below disturbance areas. Gradients of 10:1 or less are recommended in transition areas. Artificial structural controls may be used if approved by the Department. The Department may require that a qualified professional certify a diversion or drainageway design.

FLOODPLAIN AND INSTREAM MINE SITES. Locate a floodplain site where mine material removal is unlikely to induce substantial streambed degradation, streambank erosion, or channel avulsion (an abrupt change in the course of a stream whereby it deserts its old path for a new one).

Unless suitable flood-flow buffers can be maintained, avoid locating deeper excavations within the inside meander of streams due to a substantial risk of channel avulsion. Surface-scape mining that remains above the level of the bottom of the active channel may occur within the inside meander of most stream types. At such a site, make the vertical separation large enough to maintain the hydraulic integrity of the channel. Avoid or minimize mining activities in riparian areas.

Avoid active channels of intermittent and perennial streams. Scraping or pit excavation within adjacent seasonal high water or abandoned channels may be acceptable if hydraulic changes are likely to be minimal. It may be acceptable to mine in or adjacent to a low activity intermittent drainageway or an ephemeral drainageway, depending on the site.

Protect disturbed areas from surface water flow until vegetation is established. If a natural or man-made buffer or berm is proposed as a “permanent” feature, consider that it may eventually fail. Construct and reclaim the slopes, inlets, and outlets of floodplain and instream mine sites for long-term stability. Slopes of 5:1 or less, and channel gradients of 10:1 or less, are recommended. Consider the use of erosion control products and artificial structural controls.

MULCHING. Use mulch to protect soil and enhance plant establishment. Mulch reduces water and wind erosion, decreases soil crusting, increases water infiltration and retention, moderates soil temperature, and holds seed and fertilizer in place. Mulching is most beneficial on steep or south-facing slopes, exposed sites, droughty surfaces, and reclaimed drainageways. Apply a mulch of clean hay or straw at a rate of 1 to 2 tons per acre, depending on slope and site conditions, and anchor it to the soil. Other commonly used mulches include manure, wood residue, and hydromulch.

SEEDING. See the Seed Mix Guideline or select perennial species based on site conditions, the postmining land use, compatibility with surrounding vegetation, and landowner preference. Each seed mix should include a minimum of:

1. A sod-forming grass.
2. A bunchgrass.
3. A legume.

Base drill-seeding rates on 40 pure live seeds per square foot. Double the drill-seeding rate for broadcast seeding. If the plan is to use a herbicide to control weeds, do not include a legume in the seed mix. Prepare a seedbed that is free of debris, smooth, firm, and weed free. An average person's footprint should go no deeper than 1/4" to 1/2" in a seedbed prepared for drill seeding. Broadcast seeding requires a rougher and looser seedbed.

Drill seed to 1/2" in fine-textured and loamy soils and to 1" in coarse-textured soils. Packing after drill seeding and dragging or pressing after broadcast seeding is recommended to help cover the seed and increase soil-seed contact. The best period for seeding is November through April. Late fall seeding is preferable because seeding conditions are more favorable and the seed will be in place when the following growing season begins.

SOIL AND OVERBURDEN. The natural arrangement of soil material in layers is apparent to casual observation. These layers, or soil horizons, lie parallel to the ground surface and are the result of soil forming processes. The collective sequence of horizons from the surface downward is called the "soil profile." Each soil has a unique profile containing a certain number, kind, and sequence of horizons. Well-developed mineral soils normally have A (topsoil), B (subsoil), and C (parent material) soil horizons.

The A horizon is where most root activity occurs and is usually the most productive soil layer. The B horizon is an important source of nutrients and water for plants and normally contains a substantial portion of the plant roots. The C horizon is the deepest in the soil profile and least changed by soil forming processes. Plant roots may penetrate the C horizon and it can be an important source of water for plants.

SUBSURFACE DRAINAGE. Adequate subsurface drainage must be established for sites to be reclaimed to cropland or another use that requires a well-drained root zone. This may be accomplished with an adequate overburden and soil replacement thickness, a combination of thorough pit floor ripping and overburden and soil replacement, or the establishment of a drainage layer.

WEED CONTROL. The best weed control method is to prepare and seed a disturbed area at the first seasonal opportunity. A light cover of weeds typically develops on seeded areas and usually provides the benefits of a standing mulch. After a couple of growing seasons, weeds should yield to the seeded species, especially if direct weed control measures have been used.

Direct weed control measures may be performed by the operator, or through an agreement with the landowner, a commercial applicator, or the local weed district. A direct weed control program is recommended for all seeded areas during the first growing season, and should include spraying or mowing as described below:

Spraying. Identify the types of weeds to be controlled, select the correct herbicide, observe label directions, evaluate effectiveness, and determine if follow-up measures are needed. Spray when grass seedlings have reached a height of 10 inches. Remember that herbicides will kill legumes and other non-grass plants, and that caution must be exercised when spraying near surface and ground water.

Mowing. Mow weeds before or at the bud (flower) stage during late spring. Mow to a height of 6 to 8 inches. Thereafter, mow when weeds flower again or when they grow higher than the seeded grasses. An area may need mowing more than once during the growing season. Mowing is the preferred weed control method when legumes and other non-grass plants are present, and for use near surface and ground water.